IR-2171

PETITION FEE
Under 37 CFR 1.17(f), (g) & (h)
TRANSMITTAL
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Application Number	**10/646,894**
Filing Date	**November 21, 2005**
First Named Inventor	**A. EBATA et al.**
Art Unit	**2171**
Examiner Name	**A. EBATA et al.**
Attorney Docket Number	**520.43071X00**

Enclosed is a petition filed under 37 CFR 1.102(d) that requires a processing fee (37 CFR 1.17(f), (g), or (h)). Payment of $ 130.00 is enclosed.
This form should be included with the above-mentioned petition and faxed or mailed to the Office using the appropriate Mail Stop (e.g., Mail Stop Petition), if applicable. For transmittal of processing fees under 37 CFR 1.17(i), see form PTO/SB/17i.

Payment of Fees (small entity amounts are NOT available for the petition (fees))

☒ The Commissioner is hereby authorized to charge the following fees to Deposit Account No. <u>50-1417</u>:

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Petition Fees under 37 CFR 1.17(f):   **Fee $400**   **Fee Code 1462**
For petitions filed under:
§ 1.53(e) - to accord a filing date.
§ 1.57(a) - to according a filing date.
§ 1.182 – for decision on a question not specifically provided for.
§ 1.183 – to suspend the rules.
§ 1.378(e) for reconsideration of decision on petition refusing to accept delayed payment of maintenance fee in an expired patent.
§ 1.741(b) – to accord a filing date to an application under §1.740 for extension of a patent term.

Petition Fees under 37 CFR 1.17(g):   **Fee $200**   **Fee code 1463**
For petitions filed under:
§1.12 - for access to an assignment record.
§1.14 - for access to an application.
§1.47 - for filing by other than all the inventors or a person not the inventor.
§1.59 - for expungement of information.
§1.103(a) - to suspend action in an application.
§1.136(b) - for review of a request for extension of time when the provisions of section 1.136(a) are not available.
§1.295 - for review of refusal to publish a statutory invention registration.
§1.296 - to withdraw a request for publication of a statutory invention registration filed on or after the date the notice of intent to publish issued.
§1.377 – for review of decision refusing to accept and record payment of a maintenance fee filed prior to expiration of a patent.
§1.550(c) – for patent owner requests for extension of time in ex parte reexamination proceedings.
§1.956 – for patent owner requests for extension of time in inter partes reexamination proceedings.
§ 5.12 – for expedited handling of a foreign filing license.
§ 5.15 – for changing the scope of a license.
§ 5.25 – for retroactive license.

Petition Fees under 37 CFR 1.17(h):   **Fee $130**   **Fee Code 1464**
For petitions filed under:
§1.19(g) – to request documents in a form other than that provided in this part.
§1.84 – for accepting color drawings or photographs.
§1.91 – for entry of a model or exhibit.
§1.102(d) – to make an application special.
§1.138(c) – to expressly abandon an application to avoid publication.
§1.313 – to withdraw an application from issue.
§1.314 – to defer issuance of a patent.

Name (Print/Type)	Colin D. Barnitz	*Registration No. (Attorney/Agent)*	**35,061**
Signature		*Date*	November 21, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	**10/646,894**	Confirmation No. 1235
Applicant	:	EBATA, A. et al.	
Filed	:	August 25, 2003	
Title	:	METHOD FOR REBALANCING FREE DISK SPACE AMONG NETWORK STORAGES VIRTUALIZED INTO A SINGLE FILE	
TC/AU	:	2171	
Examiner	:	TBD	
Docket No.	:	520.43071X00	
Customer No.:		24956	

PETITION TO MAKE SPECIAL
(ACCELERATED EXAMINATION UNDER 37 CFR §1.102(d))

MAIL STOP: PETITION
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Applicants petition the Commissioner to make the above-identified

application special in accordance with 37 CFR §1.102(d). In support of this Petition,

pursuant to MPEP § 708.02(VIII), Applicants state the following.

(A)   REQUIRED FEE

This Petition is accompanied by the fee set forth in 37 CFR § 1.117(h).

Payment of the fee has been made in the manner set forth below in Section (G).

(B)   ALL CLAIMS ARE DIRECTED TO A SINGLE INVENTION

Following the Preliminary Amendment filed on the same date as this paper,

claims 1-23 remain pending in the application. All the pending claims of the

application are directed to a single invention. If the Office determines that all claims

in the application are not directed to a single invention, Applicant will make election

without traverse as a prerequisite to the grant of special status in conformity with

established telephone restriction practice.

As set forth in independent claims 1, 15 and 19, the invention is generally

directed to rebalancing disks among multiple storages in a virtualized network

storage system. Under independent claim 1, the invention is a method for

rebalancing disks among multiple network storage devices in a virtualized network

storage system including a network connecting the multiple network storage devices

and a virtualizing device, wherein said multiple network storage devices virtually

appear to clients as if the network storage devices were a single network storage

device owing to the functions of said virtualizing device, the method comprising: a

rebalancing process which comprises the steps of: a disk rebalancing step that

includes moving one or more files stored in a first network storage device of said

multiple network storage devices to a second network storage device of said multiple

network storage devices; and a termination judging step that includes examining free

disk spaces in individual network storage devices to judge whether to continue disk

rebalancing processing based on a maximum value and a minimum value of the free

disk spaces and a first threshold and, if the processing should be continued, going

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back to said disk rebalancing step and if the processing is not to be continued,

terminating the processing; and a monitoring process which comprises the steps of:

a first start of rebalancing determining step that includes periodically examining the

free disk space in each of said multiple network storage devices, and judging based

on the maximum value and minimum value of the free disk spaces and a second

threshold whether to start the rebalancing process; and a rebalancing starting step in

which, if it is judged in the first start of rebalancing determining step that rebalancing

should be started, the rebalancing process is started.

Furthermore, under independent claim 15, the invention is a method for

rebalancing disks among multiple network storage devices in a virtualized network

storage system including a network connecting the multiple network storage devices

and a virtualizing device, wherein said multiple network storage devices virtually

appear to clients as if the storage devices were a single network storage device

owing to the functions of said virtualizing device, the method comprising: a

rebalancing process which comprises the steps of: a disk rebalancing step that

includes migrating a file group comprising one or more files stored in a first network

storage device of said multiple network storage devices to a second network storage

device of said multiple network storage devices and a termination judging step that

includes examining free disk spaces in individual network storage devices, judging

based on a maximum value and a minimum value of the free disk spaces and a first

threshold whether to continue rebalancing processing, and if the processing it to be

continued, going back to said disk rebalancing step, and if the processing is not to be

continued, terminating the processing; and a monitoring process which comprises

the steps of: a first start of rebalancing determining step that includes periodically

examining the free disk space in each of said multiple network storage devices, and

judging whether to start the rebalancing process based on the maximum value and

minimum value of the free disk spaces and a second threshold and a rebalancing

starting step that includes starting said rebalancing process if it is judged in the first

start of rebalancing determining step that rebalancing should be started.

Additionally, under independent claim 19, the invention is a virtualized network

storage system including a network connecting multiple network storage devices and

a virtualizing device, wherein said multiple network storage devices virtually appear

to clients as if the network storage devices were a single network storage device

owing to said virtualizing device, the system, wherein said virtualizing device

comprises a holding means for holding file location information indicating a

correlation between files and network storage devices which store the files, a

virtualizing means, and a disk rebalancing means, and the disk rebalancing means

further comprises: a free disk space measuring unit which measures free disk

spaces in individual network storage devices; a rebalancing controller which

determines a difference between a maximum value and a minimum value of the free

disk space in each of the individual network storage devices obtained from said free

disk space measuring unit, determines to start rebalancing if the difference is equal

to or greater than a first threshold, selects a network storage device having the

smallest free disk space as a source network storage device and a network storage

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device having the largest free disk space as a destination network storage device,

and stops said rebalancing when the difference between the maximum value and

minimum value of the free disk spaces falls below a second threshold; and a file

object mover which moves files from the selected source network storage device to

the destination network storage device and thereby carries out said rebalancing.

(C)   PRE-EXAMINATION SEARCH

A pre-examination search has been conducted, directed to the invention as

claimed. The pre-examination search was conducted in the following US Manual of

Classification areas:

Class	Subclass
707	10, 200, 205
709	223, 224, 226
711	100, 112, 170, 203

Furthermore, a keyword search was conducted on the USPTO's full-text

database including published U.S. patent applications.

(D)   REFERENCES DEEMED MOST-CLOSELY RELATED TO THE SUBJECT MATTER ENCOMPASSED BY THE CLAIMS

Based upon a review of the documents located by the search and the

documents already of record in the application, the references deemed to be most-

closely related to the subject matter encompassed by the claims are listed below.

Document No.	Inventor
US 20030220985	Kawamoto et al.
US 20040010654	Yasuda et al.
US 20040068609	Umberger et al.
US 20040205143	Uemura
US 20040215622	Dubnicki et al.

Because all of the above-listed references (as well as any other references uncovered during the search) have been made of record in the present application by an Information Disclosure Statement filed July 13, 2005, in accordance with MPEP § 708.02(VIII)(D), additional copies of these documents have not been submitted with this Petition.

(E)   DETAILED DISCUSSION OF THE REFERENCES

Following a brief discussion of features of the invention in Section (E)(1) below, the references deemed most-closely related are discussed in Section (E)(2) below, pointing out, with the particularity required by 37 CFR 1.111 (b) and (c), how the claimed subject matter is patentable over the teachings of these documents.

(1)   It is Submitted that the Present Invention is Patentable Over the References for the Following Reasons

The present invention provides for moving files between multiple network storage devices in a virtualized network storage system, thereby rebalancing the free disk spaces in the storage devices. The invention periodically judges whether to start rebalancing. One condition for starting rebalancing is judging whether to start the rebalancing process based on the maximum value and minimum value of the

free disk spaces and a threshold. Rebalancing is carried out until the difference in free disk spaces falls below another threshold.

It is submitted that the cited references, whether taken individually or in combination with each other, fail to teach or suggest the invention as claimed. In particular, the cited references, at a minimum, fail to teach or suggest, as recited in the claims:

a first feature of the present invention, as recited in independent claim 1, including, in a rebalancing process in a virtualized network storage system, examining free disk spaces in individual network storage devices to judge whether to continue disk rebalancing processing based on a maximum value and a minimum value of the free disk spaces and a first threshold;

a second feature of the present invention, as recited in independent claim 15, including, in a method for rebalancing disks among multiple network storage devices in a virtualized network storage system, examining free disk spaces in individual network storage devices, and judging based on a maximum value and a minimum value of the free disk spaces and a first threshold whether to continue rebalancing processing; and

a third feature of the present invention, as recited in independent claim 19, including, in a virtualized network storage system, a rebalancing controller which determines a difference between a maximum value and a minimum value of the free disk space in each of the individual network storage devices, determines to start rebalancing if the difference is equal to or greater than a first threshold, and stops the

rebalancing when the difference between the maximum value and minimum value of the free disk spaces falls below a second threshold.

(2)   Discussion of the References Deemed to be Most-Closely Related

The patent application publication to Kawamoto et al., US 20030220985, which is assigned to the same assignee as the present invention, is directed to a method for virtualizing one or more network storage devices into a virtualized file system view network storage system. When the available disk size in any network storage unit is found to be below an established value, the disk monitoring means also uses a mover module to move a file or send a message to the administrator urging the addition of new network storage units. The virtualizing device 3 separates the files into file groups, assigns a destination network storage device for the file to each file group and stores files belonging to the same file group into the same network storage unit. File groups are established in a number equal to or greater than the number of network storage units 5, 6, 7. In the move process, files are moved in file group units from the currently stored network storage unit to another network storage unit. When the available disk space (capacity) of the network storage unit is small or the differential between network storage units widens, the virtualizing device 3 starts the leveling processing and moves the file groups so that the available disk space (capacity) will be uniform among the network storage units. (See, e.g., paragraphs 14-16, 42-43, 84-88 and 105-107.)

However, Kawamoto et al. do not teach or suggest the features of the present invention, such as a rebalancing process that includes judging whether to continue the rebalancing processing. More particularly, Kawamoto et al. do not teach or suggest the above-described first feature of the present invention, as recited in independent claim 1, the above-described second feature of the present invention, as recited in independent claim 15, or the above-described third feature of the present invention, as recited in independent claim 19.

The patent application publication to Yasuda et al., US 20040010654, which is assigned to the same assignee as the present invention, provides for a system and method for virtualizing network storages into a single file system view. Discussed is a virtualizing system 123, wherein a management unit 130 virtualizes a plurality of network storages by rewriting a host table 140 and unified management directory 141. File migration unit 136, which is included in virtualizing system 123, may be initiated to migrate files by management unit 130 when existing network storage 103 becomes below a threshold. When free space of a storage device 112 becomes small, the file migration unit 136 moves files from existing network storage 103 to new network storage 104. Further, in the case that unbalance occurs between free space in the existing network storage 103 and free space in the new network storage 104, the file migration unit 136 moves a file from a network storage of smaller free space to a network storage of larger free space. Thus, file migration by file migration unit 136 may also be initiated by management unit 130 in accordance with a result of

monitoring free space, and when the free space of physical storages becomes larger

than the threshold in the file migration process, the migration process is finished.

(See, e.g., figure 1 and paragraphs 71, 72, 83, 99, and 100.)

However, Yasuda et al. do not teach or suggest the features of the present

invention, such as a rebalancing process that includes judging whether to continue

the rebalancing processing based on maximum and minimum values of free disk

space. More particularly, Yasuda et al. do not teach or suggest the above-described

first feature of the present invention, as recited in independent claim 1, the above-

described second feature of the present invention, as recited in independent claim

15, or the above-described third feature of the present invention, as recited in

independent claim 19.

The patent application publication to Umberger et al., US 20040068609,

provides for a method for managing a data storage array, and a computer system

including a raid controller. Disclosed is an I/O monitor 118 within a controller 116

that may be configured to determine the respective sizes of spaces 150, 152 and

154 responsive to accessing. Shown in figure 3 is a "makespace" operation, which

may be performed as a background process 200, such that a user 156 is unaware

that the background process 200 is in progress. I/O monitor 118 may determine free

space 150 in storage 128, and then may compare this value to the value of minimum

quantity of free space 150 required to be kept in storage 128. If the outcome is that

this value is less than then the minimum value, then additional free space 150 may

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be created in storage 128 by selectively moving blocks of data from space 152 to space 154. Once the moving is complete, a wait period is performed, and after the wait period is complete the process may be repeated. (See, e.g., figure 1 and paragraphs 21, 22, 23, 26, 29, 30, 32, 37, and 39.) However, Umberger et al. are not directed to a virtualized network storage system. Further, Umberger et al. do not teach or suggest the features of the present invention, such as judging whether to continue rebalancing based on the minimum and maximum free space on disks. More particularly, Umberger et al. do not teach or suggest the above-described first feature of the present invention, as recited in independent claim 1, the above-described second feature of the present invention, as recited in independent claim 15, or the above-described third feature of the present invention, as recited in independent claim 19.

The patent application publication to Uemura, US 20040205143, provides for a network storage virtualization method and system. Disclosed is a first network storage, which may receive requests from clients and transfer them to a directory server. The directory server may then select a second network storage as the network storage to process the request based on the file management information. The second network storage may transmit the result of processes with inclusion of a response which suggests as if the request were processed by the first network storage, and thus a client will not know which network storages have conducted the processes. (See, e.g., paragraphs 25 and 28.) Thus, Uemura does not teach or

suggest the features of the present invention, such as a disk rebalancing method that takes in account the amount of remaining free disk space or judging whether to continue operations based on the minimum and maximum free space on disks. More particularly, Uemura does not teach or suggest the above-described first feature of the present invention, as recited in independent claim 1, the above-described second feature of the present invention, as recited in independent claim 15, or the above-described third feature of the present invention, as recited in independent claim 19.

The patent application publication to Dubnicki et al., US 20040215622, provides for a peer-to-peer system and method with improved utilization. Discussed is a method for transferring a zone on a physical node when the storage on the physical node is exhausted or number of hosted zones becomes greater than the number of available slots. A suitable physical node to receive the zone appears to require having enough free space after the move at least δ higher than free space before the move, where δ is equal to half the storage used by a zone F. Further, among the candidates, it is preferable to choose a node with the most available free space. The best candidate, however, is found by evaluating the transfer condition at each physical node in the system. (See, e.g., paragraphs 28, 29, and 30.) Thus, Dubnicki et al. do not teach or suggest the features of the present invention, such as a virtualized network storage system that includes judging whether to continue rebalancing operations based on the minimum and maximum free space on disk.

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More particularly, Dubnicki et al. do not teach or suggest the above-described first feature of the present invention, as recited in independent claim 1, the above-described second feature of the present invention, as recited in independent claim 15, or the above-described third feature of the present invention, as recited in independent claim 19.

(F)   Conclusion

Therefore, since the cited references, at a minimum, fail to teach or suggest the above-described first feature of the present invention, as recited in independent claim 1, the above-described second feature of the present invention, as recited in independent claim 15, and the above-described third feature of the present invention, as recited in independent claim 19, it is submitted that all of the claims are patentable over the cited references, whether the references are taken individually or in combination with each other.

Applicants have conducted what they believe to be a reasonable search, but make no representation that "better" or more relevant prior art does not exist. The United States Patent and Trademark Office is urged to conduct its own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited herein and any other prior art that the United States Patent and Trademark Office may locate in its own independent search. Further, while Applicants have identified in good faith certain portions of each of the references listed herein in order to provide the requisite detailed discussion of how the claimed subject matter is

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patentable over the references, the United States Patent and Trademark Office should not limit its review to the identified portions but rather, is urged to review and consider the entirety of each reference, and not to rely solely on the identified portions when examining this application.

In view of the foregoing, Applicants request that this Petition to Make Special be granted and that the application undergo the accelerated examination procedure set forth in MPEP 708.02 VIII.

(G)   FEE PAYMENT (37 C.F.R. 1.17(h))

The fee required by 37 C.F.R. § 1.17(h) is to be paid by:

[ ]   the Credit Card Payment Form (attached) for $130.00.

[ ]   charging Account 50-1417 the sum of $130.00.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417. A duplicate of this petition is attached.

Respectfully submitted,

Colin D. Barnitz
Registration No. 35,061

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